Comparison of Allergic Rhinitis Responses During Grass Pollen Season to Those Induced by Controlled Grass Pollen Exposure in the Environmental Exposure Unit (EEU)

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Abstract

Rationale: The Environmental Exposure Unit (EEU) is a controlled allergen challenge model of allergic rhinitis. We sought to characterize the comparability of symptoms experienced by grass pollen allergic volunteers during the regular grass pollen season to those developed during controlled grass pollen exposure in the EEU.

Methods: In 2011, 20 participants with grass pollen allergy completed a 3-month study in the EEU. Surveys were conducted in real-time during the 2011 grass pollen season, documenting perceived and objective severity during grass pollen season, with repeat measures at 3-hour exposure days. The same 11 participants also participated in the EEU study after 3-hour exposure to grass pollen for 3 hours in the EEU. Nasal symptoms were measured using the Upright Nasal Symptom Scale (UNSS) and peak nasal inspiratory flow (PNI)

Results: In our study, nasal symptoms were significantly more severe in the EEU than on average during the grass pollen season. In the EEU, the symptoms of nasal congestion, sneezing, and postnasal drip were significantly more severe on average than during the grass pollen season. However, the symptoms of itchy eyes and nasal itching were not significantly different from the grass pollen season.

Discussion: Our findings support the use of the EEU as a model of allergic rhinitis. However, the severity of symptoms during the grass pollen season was still significantly more severe than in the EEU.

Background

The EEU is a unique, validated, internationally recognized research facility that allows for the exposure of groups of 5 to 15 volunteers to ambient levels of airborne pollen allergens.

Methods

In May and June of 2011, participants in the Kingston Allergy Research Unit completed a 3-month study involving a voluntary survey for completion documenting real-time self-perceived grass allergy AR symptom severity during average and peak pollen exposure days. The study was conducted during the grass pollen season, with repeat measures at 3-hour exposure days. The same 11 participants also participated in the EEU study after 3-hour exposure to grass pollen for 3 hours in the EEU.

In August of 2012, our study was conducted a clinical validation of grass pollen in the EEU. In this study, participants on file from previous enrolment in an EEU study were selected for inclusion in this study. The participants were divided into two groups: those with moderate hay fever and those with severe hay fever. The hay fever severity was assessed using the Upright Nasal Symptom Scale (UNSS) and peak nasal inspiratory flow (PNI)

Results

Survey data were condensed from a 10-point severity scale to the 4-point severity scale used in the EEU as outlined in Table 2. As well, the categories of red eyes and watery eyes in the EEU data were combined, with the higher of the two severity ratings being used to allow comparison with the single red/watery eye category used in the survey.

Table 2: Medication Washout Periods

<table>
<thead>
<tr>
<th>Medication</th>
<th>Washout Period</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ambenadon</td>
<td>7 days</td>
</tr>
<tr>
<td>Intranasal or intraocular corticosteroids</td>
<td>14 days</td>
</tr>
<tr>
<td>Intranasal or intraocular creams</td>
<td>14 days</td>
</tr>
<tr>
<td>Systemic corticosteroids or antihistamine</td>
<td>30 days</td>
</tr>
</tbody>
</table>

The current study confirms that nasal symptoms were comparable severity during EEU exposure to those experienced in grass pollen season, while sneezing and eye symptoms often less severe in the EEU than in the natural season.

Conclusions

Exposure in the EEU produces comparable symptoms severity nasal symptoms, with sneezing and eye symptoms often less severe in the EEU than noted in the natural season.

Limitations of this study include the small sample size, the use of different ratings scales and slightly different symptom categories in the survey compared to the EEU symptom diary cards.

Objectives

Characterize the comparability of symptoms experienced by grass pollen allergic volunteers during the regular grass pollen season to those developed during controlled grass pollen exposure in the EEU.